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Mobile Telephony in Latin America: New Opportunities to Reduce Poverty?

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ABSTRACT

The strong pattern of inequality that marks Latin America and the Caribbean (LAC) is repeated, although with different characteristics, in access to information and communication technologies (ICTs). Although it is not currently possible to demonstrate empirically, in great detail, that mobile telephony is making a substantive contribution to poverty reduction in LAC, we aim to shed light on certain areas. First, we argue that mobile telephony penetration has been significantly higher than that of other ICTs among the poorest sectors of the population. Second, by constructing Gini indexes of phone access, data show that the distribution of mobile telephony is consistently more equitable than that of landlines in LAC. Third, the high degree of mobile telephone penetration in poor sectors sparks new implications about possible strategies and tools for promoting other ICTs, which have had comparatively less impact so far. We seek then to contribute to the discussion on design –or redesign- of public policies that focus on development through the use of ICTs in the region.

Keywords

ICTs, development, Latin America, mobile communications, inequality.

INTRODUCTION

The strong presence of information and communication technologies (ICTs) in nearly all spheres of modern society is one of the most prevalent characteristics of the growing globalization. Having the broadest possible access to these ICTs is increasingly perceived as a necessary condition for the successful insertion of less-developed countries into the international economy.

Many of the efforts to disseminate ICTs for development have focused on providing computers and Internet access. For example, in recent years many governments in Latin America and the Caribbean (LAC) have financed the creation of "telecenters" or community access centers based on Internet use as part of a strategy for promoting connectivity nationwide. But while many of these programs are considered successful, various studies have shown that these initiatives have had a limited impact on the eradication of poverty (Proenza et al. 2001).

In this context, studies have therefore focused on the degree of universal access and its impact, while the dissemination of other technologies (such as cellular telephones) has received less attention. Since 2001, the number of cellular telephone lines in the region has grown significantly, doubling in only four years and reaching growth rates of 300 percent countries such as Argentina and Peru. These penetration levels have far outstripped those of traditional landlines.

The recent spectacular spread of cellular telephony in the poorest sectors in countries outside LAC has attracted the attention of companies and development experts worldwide. In Africa and Asia, efforts have been made to understand both the social and economic contributions of mobile telephony in rural and low-income urban sectors, with favorable findings (Vodafone 2005, Souter et al. 2005, Zainudeen et al. 2006). In Latin America, there is still little detailed evidence about the potential of mobile telephony as a tool for improving the standard of living of people who are poor or marginalized, as well as rural populations in the region.

Even when the use of mobile phones in the region has grown dramatically, whether its usage is effectively reaching the poor groups of the region can be debatable. Based on this question, the aim of this paper is twofold: first, to present an overview of cellular telephony statistics in LAC with a focus on providing inequality measures; and second, based on recent surveys on the topic, to present a review on how mobile telephony could contribute to the improvement of the livelihood of poor and

vulnerable groups in the region. Shedding light on these issues contributes to future debates to help support the design or redesign of public ICT-based development policies for the region.

The article is organized as follows. The first section presents a brief review on the debate towards ICTs, development and globalization. Then, we portray the main statistics on mobile expansion in the region, and present an analysis using inequality measures. The fourth section opens the discussion on the possible implications of the broader use of mobile telephony among the poor in LAC, drawn from the experience and available data on other regions. Finally, we present the preliminary conclusions.

GLOBALIZATION, ICTS AND DEVELOPMENT IN LATIN AMERICA

It can be said that ICTs are both cause and consequence of the process of globalization. On the one hand, ICTs are a cause because they are one of the principal agents that make globalization possible, and which make it increasingly intense and diverse. But development of ICTs is also a consequence of globalization, since the existence of a more global market for the exchange of goods and services has expanded the use of these technologies to every corner of the planet. Nevertheless, there are significant inequalities in both access to and use of ICTs among and within countries. This has been termed the *digital divide* or *digital inequality.* This new type of inequality exacerbates the gaps that already existed, such as those related to income, social capital and other socio-economic variables (Aladi 2003).

In this arena, some economists hold that the indiscriminate freeing of trade, far from improving economic stability and spurring economic growth, has undermined it (Stiglitz 2004). According to this view, the effects of globalization on poverty and inequality worldwide have been, in net terms, negative during the past three decades (Wade 2004, Went 2003, Woodward and Simms 2006). There is a certain degree of consensus that while the relative income gap among the world's countries has decreased, the absolute income gap has increased considerably and will continue to do so (Prabhakar 2003, Wade 2004, Svedberg 2004).

This is particularly serious in Latin America. Most of the region's countries have participated actively in the globalization process, opening up their markets to a great extent because of the reform and structural adjustment processes of the 1990s. Contrary to the claims of international financial bodies, these reforms did not have the expected impact on reducing poverty and inequality (Vos *et al* 2002). Latin America and the Caribbean is still the most unequal region in the world, with a large proportion of the population living in poverty. According to the most recent report by the Economic Commission for Latin America and the Caribbean (Eclac), in 2005 an estimated 209 million people (nearly 40 percent of the region's population) were living in poverty, 81 million of them in extreme poverty (Eclac 2006).

Given this relative failure of the adjustment processes, ICTs began to carry greater weight on public agendas as a strategy for economic growth and poverty reduction in LAC.

In studies related to economic growth and its determining factors, which have a long history, telecommunications and other ICTs are playing an increasingly important role. Their significance as catalysts for economic growth lies essentially in the fact that the expansion of telecommunications reduces transaction costs, expands market boundaries and greatly increases the flow of information (Waverman et al. 2005). One contribution in the field of ICTs, development and economic growth is the work of Mansell and When, who note the significant impact of ICTs on this latter variable (Mansell and When 1998). Similarly, Roeller and Waverman (2001) defend the importance of investing in public networking infrastructure, as it correlates strongly with countries' economic growth.

In recent years, various works have focused on countries in the Organization for Economic Cooperation and Development (OECD), with a more optimistic view of the positive impact of ICTs on economic growth (Indjikian and Siegel 2005, OECD 2003). In Latin America, a study carried out by the GSM Association showed interesting figures for mobile telephony as a generator of economic, commercial and social value (Lewin and Sweet 2005).

Nevertheless, the causal links and assumptions underlying the relationship between ICT and economic growth and development are the subject of fierce debate in academic literature on the subject (Avgerou 2003, Heeks and Kenny 2002). Skeptical views of ICTs include those that hold that the information and knowledge society is not as revolutionary or novel as some people think, and that the basis for income accumulation and distribution is the same as in traditional capitalist society (May 2002). Some authors question whether we should apply ICTs to the Millennium Development Goals as a development paradigm (Heeks 2005, Schech 2002). Even in developed countries that are considered successful, such as Ireland, some people question various aspects of the ICT "miracle" as a development strategy (Kirby 2003, 2004). Finally, there are also some authors that distrust about the technology capacity to eventually skip stages of development (Primo Braga et al. 2002), or who, even assuming benefits from ICTs, believe that these are unlikely to reach the poorest and most vulnerable sectors of the population (Saith 2003).

The fact that mobile telephony penetration has increased dramatically in the recent years, suggest the need of a more in-depth examination of the phenomena. Whether mobile penetration is also reaching the poor groups of the region can be debatable. Thus, the following section presents an overview of statistics for the region, and sheds light on mobile access and its distribution among poor sectors.

EXPANSION OF MOBILE TELEPHONY AND INEQUALITY INDICATORS IN LATIN AMERICA

The debate among academics, statisticians and professionals over ways of measuring poverty is far from closed in the world in general and in LAC in particular. In the field of indicators and statistics for measuring so-called "digital poverty" and its relationship to poverty in more general terms, there are enormous areas to explore. Scholars have recognized and addressed the difficulties that arise when trying to measure digital poverty (Barja and Gigler 2005, Barrantes 2005). While obtaining new indicators that make it possible to quantify these relationships is not easy, it represents a challenge and will be extremely useful for solidly establishing new proof of the potential for ICTs in development. This section presents a review of the main data on mobile telephony expansion in the region and a detailed analysis of the relationship among mobile telephony and inequality indicators.[1]

The expansion of mobile telephony in the region

In recent years, mobile telephony has expanded at high rates in all countries of the continent. Indeed, in just a few years mobile telephony penetration has reached levels far higher than those attained by fixed telephony over decades (see Figure 1). New price structures (mainly prepaid cards) and the introduction of "calling party pays" (CPP) may be the variables that have carried the greatest weight in explaining the explosive growth of mobile telephone service in the region. Both CPP and prepaid cards give mobile telephony an advantage over landlines, especially for low-consumption users (Mariscal et al. 2006). These advantages include the relatively low costs incurred by users for starting up mobile phone service, the possibility of controlling expenses and not being required to sign a contract. Except for a few cases, by 1998 the great majority of countries had adopted both incentives (the first a market mechanism and the second regulatory). Table 1 shows the evolution of mobile telephony in certain countries in LAC; the increase in penetration rates and the significant rise in access figures as of 1998 are notable.

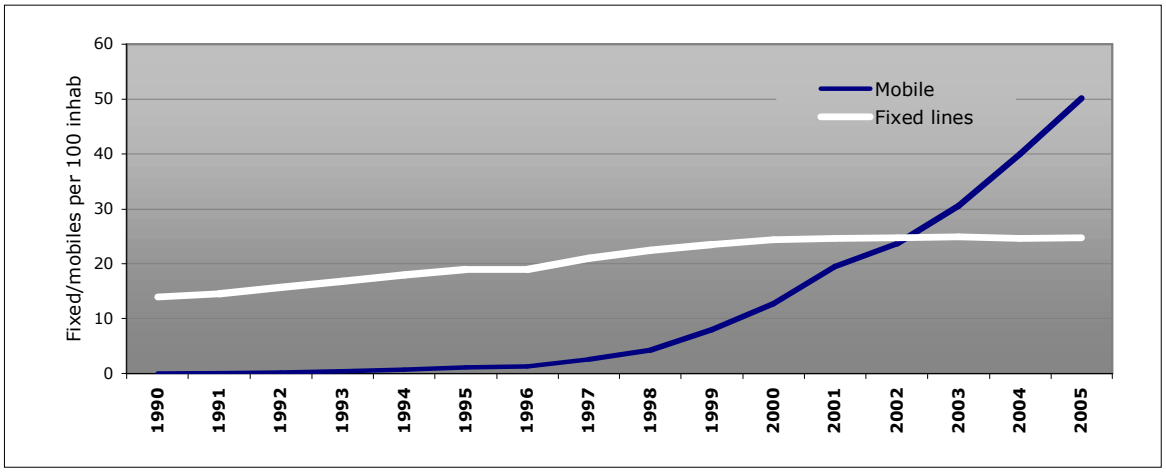

Figure 1. Fixed vs. mobile telephony in Latin America and the Caribbean

Prepared by authors based on data from the International Telecommunication Union (ITU).

[1] We based our analysis in secondary data mainly compiled by international organizations; for telecommunications indicators we relied on the International Telecommunication Union (ITU) database and data compiled by the GSM Association; for income and poverty indicators our main sources were the International Monetary Fund (IMF) and United Nations.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Argentina	1.00	1.65	4.57	7.21	12.50	16.88	19.26	17.76	19.34	35.35	57.27
Bolivia	0.00	0.00	2.00	3.00	7.00	9.00	11.00	15.00	15.00	20.00	28.00
Brazil	0.83	1.58	2.85	4.44	8.95	13.66	16.73	20.06	26.46	35.67	46.25
Chile	1.38	2.22	2.80	6.51	15.05	22.36	34.23	42.83	47.66	62.08	67.79
Colombia	1.00	1.00	3.00	4.00	5.00	5.00	8.00	11.00	14.00	23.00	48.00
Ecuador	0.00	1.00	1.00	2.00	3.00	4.00	7.00	12.00	18.00	27.00	47.00
Guatemala	0.00	1.00	2.00	2.50	3.05	7.53	9.81	13.15	16.52	25.02	31.38
Mexico	0.73	1.07	1.82	3.50	7.94	14.24	21.68	25.45	28.08	36.64	44.34
Peru	0.31	0.84	1.73	2.99	4.02	4.96	5.92	8.62	10.17	14.75	19.96
Uruguay	1.25	2.45	3.00	4.60	10.00	12.83	16.19	15.94	15.40	18.51	34.38
Venezuela	2.00	3.00	5.00	9.00	16.00	23.00	26.00	26.00	27.00	33.00	48.00

Table 1. Expansion of mobile telephony in selected Latin American countries — number of mobile lines per 100 inhabitants

Prepared by authors based on data from ITU and GSM Association.

By 2005, except for a few cases — such as Cuba and Costa Rica — the number of mobile telephone service subscribers in Latin America and the Caribbean surpassed that of landline subscribers. In countries such as Bolivia, Chile, El Salvador and Panama, access to mobile telephony was three times that of fixed telephony, and in more extreme cases, like those of Paraguay and Nicaragua, mobile telephone penetration was five times that of landlines.

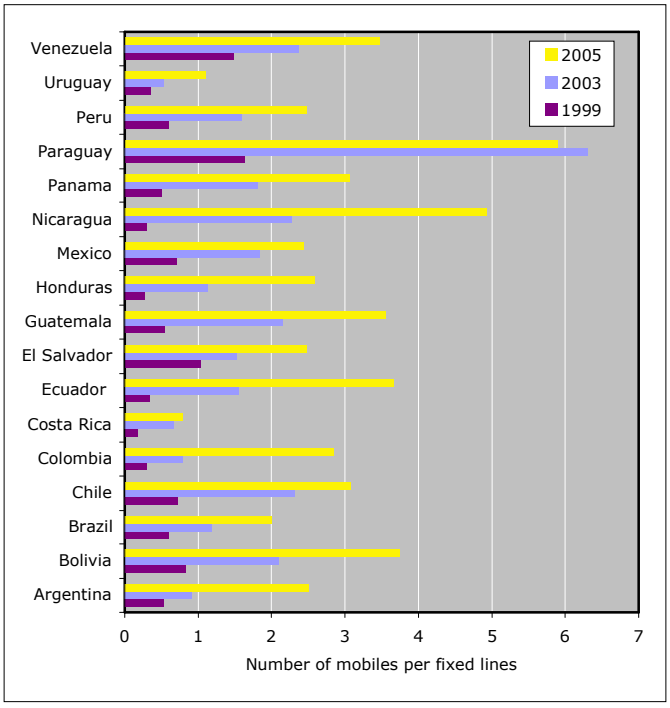

Figure 2. Number of mobile phones per fixed lines in Latin America (selected countries)

Prepared by authors based on data from ITU and GSM Association.

Mobile phones, income and inequality indicators

There have been few statistical analyses of the relationship between the expansion of mobile telephone service and its usage within low-income groups. In this section, we review the links between mobile telephony penetration and income and poverty variables.

It is well known that there is a positive relationship between income levels and access to ICTs (UNCTAD 2006, ITU 2006b, ITU/UNCTAD 2007). In other words, the higher the income level, the greater the degree of adoption of ICTs. Access to mobile telephony is no exception.

In Latin America, the relationship between these variables follows the same pattern. Figure 3 shows the relationship between access to mobile telephone service and income levels for a group of 17 countries.[2] The trend here is clearly positive. In looking at the relationship between income and degree of adoption broken down by year, we see that given the same income level, mobile penetration increases, moving toward the upper part of the graph. The results therefore show that not only does a higher income level increase mobile telephony penetration, but also if income holds steady, the values for mobile telephony penetration increase.

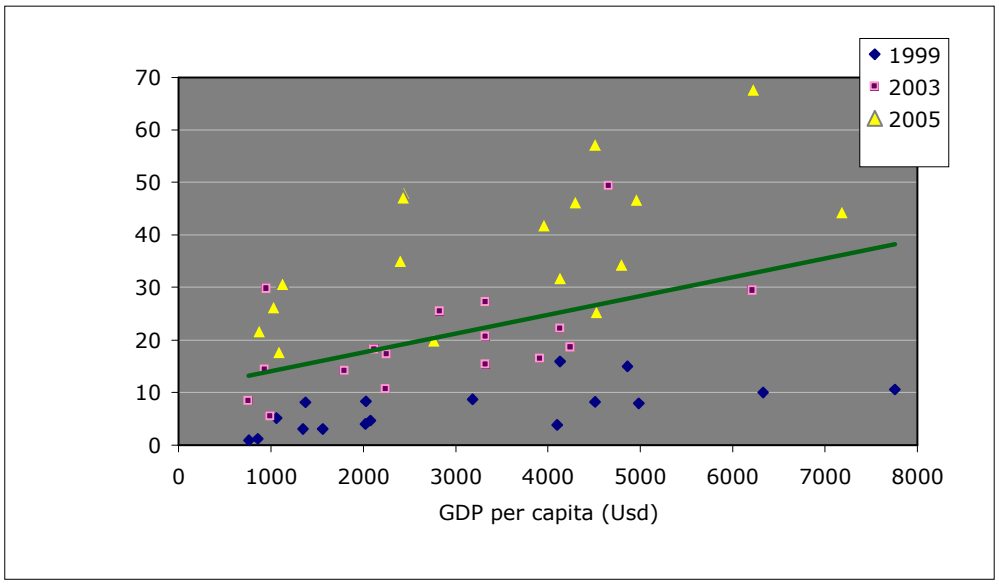

Figure 3. Mobile telephones vs. GDP per capita (Usd) (1999, 2003, 2005). Selected countries in Latin America

Prepared by authors based on data from ITU and International Monetary Fund (IMF).

Income levels, however, are not sufficient to explain how mobile penetration is distributed among the different income groups. Since we seek to understand better whether mobile phones are effectively reaching low-income users in the region, we have constructed Lorenz curves and Gini indices for mobile and fixed telephony in Latin American countries.

Both the Lorenz curve and the Gini coefficient are measurements commonly associated with studies of income inequality. Nevertheless, both can be used with other variables (in this case, telephony) to approximate distribution analysis. The Lorenz curve is a graphic measure commonly used to represent how equal certain resources are distributed in a population. If one Lorenz curve is always above another, it can be stated without question that the first shows less inequality than the second. If two Lorenz curves cross, however, the distributions of the variable that generate them are not comparable. Figure 4 shows the Lorenz curves for mobile telephony in Latin America for 2000, 2002 and 2005.[3]

[2] We based our analysis on a group of 17 countries in the region chosen for data availability, which account for 98 percent of the region's population and more than 95 percent of its income.

[3] To construct these indicators, 15 countries in the region were taken as units of analysis: Argentina, Brazil, Chile, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. To construct the curves, total

A comparison of the results for 2000 and 2002 does not allow definitive conclusions, because the two curves cross. It is clear, however, that for 2005 the distribution of mobile telephones in the region is more equitable, because the curve remains constantly above those of earlier years.

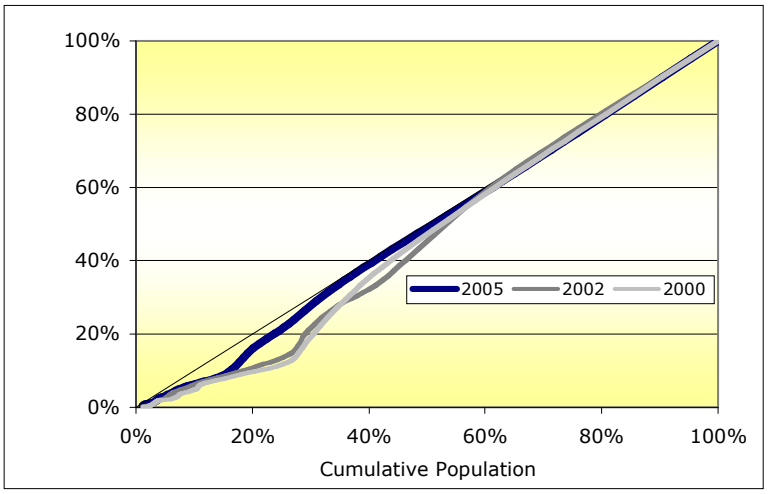

Figure 4. Lorenz curves for mobile telephony in Latin America. 2000, 2002 and 2005

Prepared by authors based on data from GSM

When we compare the distribution of access to mobile telephony and to landlines, the results also follow those described in the preceding section. While for a given income level, mobile telephones achieved a higher degree of penetration than landlines, it is also clear that mobile telephones are distributed more equitably than fixed lines.

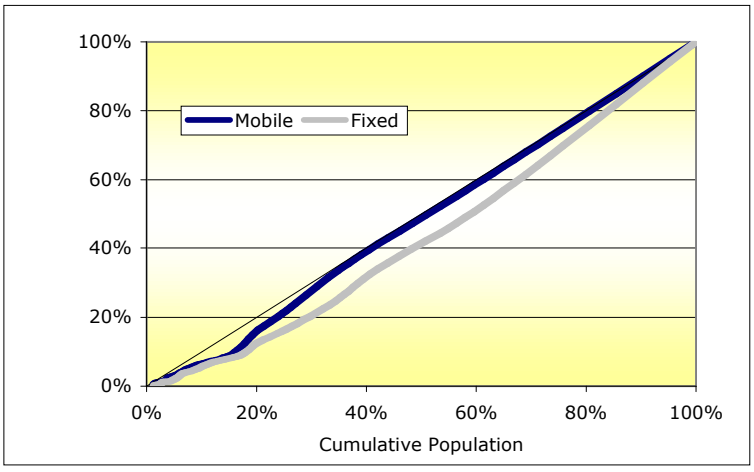

Figure 5. Lorenz curves in mobile and fixed telephony, 2005

Prepared by authors based on data from GSM

The results of calculation of the Gini coefficients for these cases point to conclusions along the same lines. The Gini index or coefficient sums up the graphic results of the Lorenz curve in a value between 0 and 1. At the extremes, a Gini index with a

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population and levels of adoption of telephony in each country were used. It is important to note that the selected countries account for at least 90 percent of the region's population and 95 percent of its income, and can therefore be considered representative.

value equal to 0 indicates the existence of perfect equality, while a value of 1 indicates perfect inequality. Thus, the closer to 0 the more equitable the distribution. Figure 6 shows the results for both mobile and fixed telephony for the years analyzed.

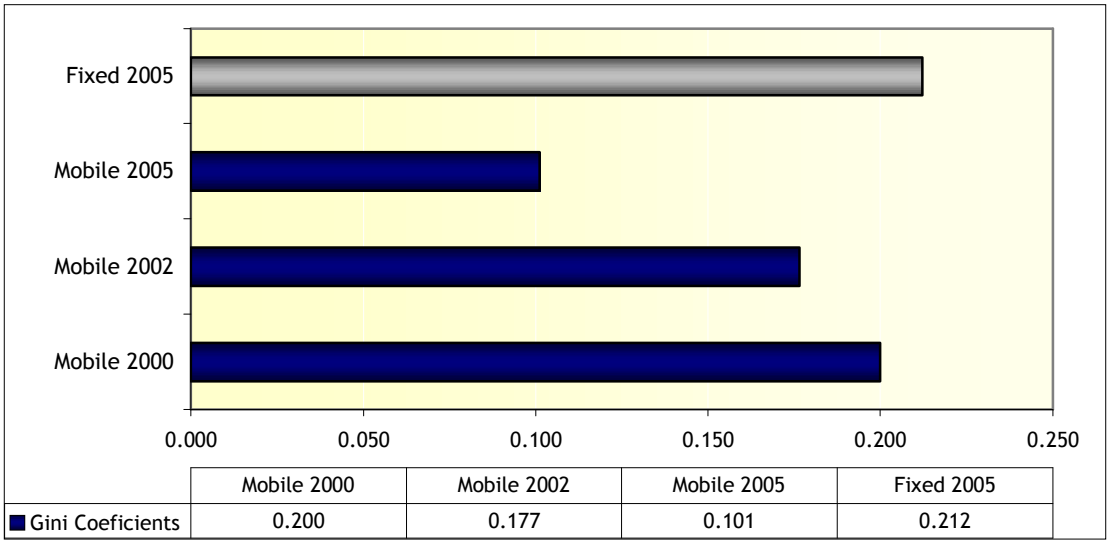

Figure 6. Gini Coefficients: Mobile and Fixed telephony

Prepared by authors based on data from GSM

Access to fixed telephony in 2005 was less equitable than access to mobile telephony in any of the years analyzed. Meanwhile, the Gini index decreased every year for mobile telephony, as the information above shows. These results are also consistent with recent international reports on the digital divide, in which mobiles appear as the most equally distributed ICTs (UNCTAD 2006, ITU and UNCTAD 2007).

In short, mobile telephones are becoming more widespread, not only in absolute terms but also in terms of distribution in the region. Now it follows to review the potential benefits and uses of mobile technology among the poor.

MOBILES AND POVERTY REDUCTION: POTENTIAL IMPACTS, OPPORTUNITIES AND CHALLENGES

One study done in Africa by the telecommunications giant Vodafone in 2005 sheds light on the potential of mobile telephony for providing socio-economic benefits, particularly in rural and marginalized parts of that region (Vodafone 2005). Many of the benefits derive from the fact that mobile phones are the only telephone service option for the low-income population and for people in remote and rural places where there is no other means of communication (Vodafone 2005).

From this and other studies done in Africa and some Asian countries, a series of benefits can be inferred. One is in the labor market, where mobile telephony facilitates both the job search and the possibility of being located by potential employers. The latter is particularly important for independent workers or those with temporary jobs, as is often the case with semi-urban, rural or marginalized populations (Vodafone 2005). Mobile telephones have also helped reduce emergency response time by facilitating immediate calls to the police or ambulance services. According to a study of the impact of telephony on rural populations in India, Tanzania and Mozambique, the mobile telephone is considered the most important means of emergency communication (Souter et al. 2005). Just as mobile telephony is the only means for many rural communities to communicate, it is also an effective way to stay in touch with family and friends. This is particularly important for families in which one or more members migrate to cities or other countries in search of better educational opportunities or employment (Vodafone 2005, Souter et al. 2005).

Recently, the Regional Dialogue on the Information Society (DIRSI) has conducted an extensive survey on 7 countries in LAC, following the methodology of the studies conducted in Asia. The survey targeted low-income residents of urban areas, and the aim was to explore the patterns of mobile usage among the poor. Overall, results suggest the same findings that those found in Asia: mobile telephony is highly valued by poor sectors in the countries surveyed. In LAC, according to the survey,

the main perceived benefit of mobile telephony is improved communication with friends and family; personal security, and business opportunities were also mentioned as major benefits (Galperin and Mariscal 2007).

Both the results of a regional survey by LirneAsia of low-income groups in Asia and the recent one done in LAC by DIRSI, showed unsatisfied demand for telecommunications services. Moreover, in contrast with popular perceptions that people in the poorest sectors cannot afford mobile telephony, there are solid indications of a strong desire in these sectors to dedicate resources to the acquisition and use of mobile telephones (Moonesinghe et al. 2006, Galperin and Mariscal 2007, Oxford Analytica 2007). This finding was a novelty and also represents a challenge for providers, which will have to innovate to adjust their plans and services to put them within reach of these communities. There is also room for new smart incentives to promote initiatives from governments as well.

Finally, the use of other services or applications, such as m-banking, m-health or m-government, are still rarely in the region. Many of these applications could be particularly beneficial to low-income sectors. The promotion of cell-phone games that focus on prevention of serious illnesses, such as HIV, constitutes a good example indeed (Mallalieu 2006). However, in contrast to the high technology that accompanies its distribution in developed countries, in LAC there is still a preponderance of equipment that is slow and unable to support data transmission and Internet use. This is a limitation to more complex and integrated use, a factor that has often been noted in debates over the digital divide. In addition, this situation also poses a challenge when thinking about which equipment, applications and services are most appropriate for the region's lowest-income sectors (Mallalieu 2006). But even though it would be possible in the near future to overcome some of these technological barriers, engaging poor people to take broader advantage of mobile services represents another challenge.

CONCLUSION

Mobile telephone service is becoming more and more widespread in the countries of Latin America and the Caribbean. Data analyzed in this paper show that mobile telephony is making giant strides in the region. Indeed, it has far outstripped landline figures, even when mobile telephones could be comparatively more expensive (Barrantes et al 2007). Both CPP and prepaid cards, which were introduced some years ago in the region, have favored the mobile phone boom. The purpose of this study was not to document the regulatory or market incentives or barriers to greater adoption of mobile telephony in the region. Nevertheless, a better understanding of those issues is central to develop appropriate public policies to promote mobile telephony for development.

As noted in this paper, income levels apparently are not sufficient to explain the levels of mobile telephony use in LAC countries. In the past, certain degrees of comfort in households could be inferred, with statistical reliability, from the existence of a landline in the home. Having a fixed telephone implied certain levels of income and/or job stability in the household, a certain degree of solidity in the construction of the home and access to potable water, certain educational parameters, etc. The mere existence of a telephone made it possible to predict other indicators of domestic comfort, satisfied basic needs and human development. But the positive correlations that apply to landlines change drastically when we analyze mobile telephony, which is basically individual and has much greater penetration among poor sectors, making these associations much weaker.

The analysis using Lorenz curves and Gini coefficients produces another interesting result: while the aggregate data do not allow a detailed understanding of how mobile phones are used or how they are reaching the lowest-income sectors in each country, they show that mobile telephony distribution in the region was considerably more equitable in 2005 than in 2000. Moreover, the distribution of mobile telephony is also significantly more equitable than that of fixed lines.

As explained throughout this document, there are strong indications of greater and growing use of mobile telephones in the region in general, and in poor groups in particular. The mobile telephony boom experienced in Latin America suggests probably the most significant ICT transformation for development. Not only in terms of inclusion and access to telecommunications and related services, but also by leveraging the tools people can use to change their economic situation. We have then preliminary noted in the previous section the economic and social contributions that mobile telephones could bring as promoters of development and factors in a higher standard of living for rural and low-income populations.

The high rate of mobile penetration also calls for a rethinking of the instruments and incentives involved in social policies in general, and those for ICTs in particular, that target low income sectors of the population. While other previous public policies has focused on providing fixed line access to remote or vulnerable areas (e.g. universal service funds) or has allocated resources for the creation of community telecentres, mobile phones were widespread among all levels of society, mainly driven by market forces. Given the fact that low-income people have already reached access to ICTs by using mobile phones, we suggest new social policies should focus on promoting a further usage of mobile applications, such as m-government, m-health or m-banking.

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